1.5 kgf / cm^2 from 1000 ℃ to each sintering (maximum) temperature shown in the tables.

(3) Evaluation

The thus obtained sintered bodies were processed and then subjected to the following evaluation.

(Density, Open porosity)

They are measured by Archimedes method using water as a medium.

(Contents of metal elements)

They are determined by inductively coupled plasma (ICP) spectrometry.

(Content of Sm2O3)

The content of Sm is determined by ICP spectrometry and then converted to the content of Sm2O3.

(Oxygen content)

It is determined by inert gas melting infrared absorptiometry analysis method.

(Carbon content)

It is determined by high frequency heating infrared absorptiometry analysis method.

(Content of Al2O3)

The total content of oxygen in the sintered body is obtained. The oxygen content in Sm2O3 was then subtracted from the total content of oxygen to calculate the remaining oxygen. The content of Al2O3 was calculated under the provision that all the remaining oxygen atoms constitute Al2O3.

(Content of AlN)

The contents of Sm2O3 and Al2O3 calculated as described above are subtracted from 100 mole percent to provide the content of AlN. This

calculation is performed under the provision that total of the contents of AlN, Sm2O3 and Al2O3 is 100 mole percent.

(Crystalline phase)

It is determined by using a rotating anode type X-ray diffraction system "RINT" supplied by "Rigaku Denki" under the following condition: CuK α, 50 kV, 300 mA, and $2\theta = 20$ to 70 ° .

(Volume resistivity)

It is measured by a method according to "JIS C 2141" from room temperature to about 400 ℃ under vacuum. The test sample has the following parts: a plate with 50 mm × 50mm × 1mm; a main electrode with a diameter of 20 mm; a guard electrode with an inner diameter of 30 mm and outer diameter of 40 mm; and an applying electrode with a diameter of 45 mm. The electrodes are formed of silver. 500 V/mm of voltage is applied and a current is read one minute after the application of voltage so that the volume resistivity is calculated.

(Activation energy)

An activation energy (Ea) of temperature dependency of volume resistivity from room temperature to 300 ℃ is calculated according to the following equation.

$$\ln \sigma = A - Ea / (kT)$$

σ : electrical conductivity $= 1/\rho$ ρ : volume resistivity

k : Boltzman's constant T : absolute temperature

A : a constant

(Thermal conductivity)

It is measured by laser flash method.

(Bending strength)

A four-point bending strength at room temperature is measured

according to "JIS R1601".

(Mean grain diameter of AlN grains)

The sintered body was polished to form a polished surface, which was observed by an electron microscope to determine grain diameter values at 30 points in a visual field. The average of the 30 values was calculated.

(Observation of microstructure)

The distribution of each element was analyzed by EPMA.

The results of the evaluation of the sintered bodies will be explained.

(1) Example 1 (refer to tables 1 and 2)

The above AlN powder "A" was used. 0.235 mole percent of Sm_2O_3 was added to the AlN powder to obtain raw mixed powder, which was sintered at 1800 ℃ to provide a dense body with a density of 3.30 g /cm^3 and an open porosity of 0. 04 percent.

The contents of oxygen, Sm and carbon in the sintered body were shown in table 1. The molar ratio of a converted content of Sm calculated as Sm_2O_3 to a calculated content of aluminum oxide (Sm_2O_3 / Al_2O_3) was 0.258.

The volume resistivity was 6 $\times 10^{10}$ Ω・cm at room temperature (25 ℃) and 1×10^{8} Ω・cm at 300 ℃. In table 2, "6 $\times 10^{10}$" was represented as "6E +10". The same method of representation will be applied in the following tables.